September-21-12 11:31:15 AM Item ID: D350-748-241TRN Accept *N900040100* Setup Start **Revision ID:** Item Name: Crosstube Turning Detail Start Date: 21/09/2012 Start Qty: 1.00 **Cust Item ID: Required Date:** 05/10/2012 Req'd Qty: 1.00 **Customer:** Reference: Run Approvals: Process Plan: MLJ Date: 12-09-21 Tooling: Date: Date: SPC (Y/N): Date: Sequence ID/ Operation Set Up/ Tool ID Tool # Plan Reject Accept Reject Insp. Work Center ID Description **Run Hours** Qty Code Qty Number Stamp Draw Nbr **Revision Nbr** D350-748-241 100 0.00 MORI SEIKI CNC LATHE LARGE *100* Mori Seiki 0.00 Memo Mori Seiki CNC Lathe Large 1-Fill tube with sand & install plugs on both ends as per Folio FA647 2-Turn first side as per Folio FA647 3- File transition lines smooth. FOLIO REV: DWG REV: 110 QC1- Inspect dimensions to dimension sheet 0.00 0.00 Memo Quality Control '

9mm,l 12/09/27

										DQA:	Date:	•
NCR: Y	es / No				WORK ORDER NON-	CO	NFORM	MANCE / UP	DATE			7,
										QA Closed:	Date:	
Work Orde	· ·				DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
WOIK OIGE	=1. 				Rework	7		Skid-tube	Crosstube	7	Water Jet	Engineering
Part N	ln				Scrap	1		Machining	Small Fab	Pro	d. Eng. Coor.	Quality
, are r					Use-as-is	1	1	noforming	Finishing	4	re/Packaging	Other
NCR N	lo			·	Work Order Update		•	Large Fab	Composite]	Supplier	
Root				Descri	I ption of work order update	Τ	Initial	Ac	ction	Sign &		
Cause.	Date	Step	Qty	(or Non-conformance	Cr	nief Eng	Desc	ription	Date	Verification	QC Inspector
Doc/Data												
Equip/Tooling												
Operator												
Material												
Setup		'				Ì						
Other												
Process												
Supplier											Ē	
Training						1						
Unapproved						<u> </u>						
					F	AUI	T CATE	GORY	<u> </u>			
Landir	ng Gear			***************************************	General	_	_		-	-		,
	Bending				Bend	<u></u>	Grain			Ovalized		Pressure/Forced
	Centre I	Not Conce	ntric to ()/S	BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure
	Cracks				Broken/Damaged		Inspecti	on Incomplete	L	Part Incorred	ct	Weld
	Crushed	/Crimped			Burrs	L	Instructi	ions Incomplete/	/Unclear	Part Lost/Mi	ssing	Wrong Stock Pulled
	Cuffs				Contamination		Mainte	nance		Part Moved		
	Heat Tre	eat			Countersink		Mislabe	led		Positioned V	Vrong	_
	Inspecti	on Strip in	Tube		Cut Too Short		Misread			Power Loss/	Surge	Other
	Ripples	in Bend			Drill Holes		Offset					

Out of Calibration

Out of Sequence

Outside Dimensions

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish

Quality Control

September-21-12 11:31:15 AM Item ID: D350-748-241TRN Accept *N900040100* Setup Start **Revision ID:** Item Name: Crosstube Turning Detail **Start Date:** 21/09/2012 Start Oty: 1.00 **Cust Item ID: Required Date:** 05/10/2012 Req'd Qty: 1.00 **Customer:** Reference: Run Start Process Plan: Approvals: Date: Tooling: Date: Date: SPC (Y/N): Date: Sequence ID/ Operation Set Up/ Tool ID Tool # Plan Reject Accept Reject Insp. Work Center ID Description **Run Hours** Code **Qty** Oty Number Stamp 120 0.00 MORI SEIKI CNC LATHE LARGE *120* Mori Seiki 0.00 Memo (1/2/2/27 Mori Seiki CNC Lathe Large 1-Turn second side as per Folio FA647 2- File transition lines smooth. 3-Scribe part # as per Dwg D350-748-241 FOLIO REV: DWG REV: 130 QC1- Inspect dimensions to dimension sheet 0.00 *130* QC 0.00 Memo **Quality Control** 140 QC8- Inspect parts - second check 0.00 *1/10* TW 12-9-28 QC 0.00 Memo

											DQA:	Date:	•
NCR:	Yes	/ No				WORK ORDER NON-	CO	NFOR	MANCE / UP	DATE			*
		***	-								QA Closed:	Date:	
Work Ord	٥٢.					DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Work Ord	er.					Rework	7	1	Skid-tube	Crosstube	1	Water Jet	Engineering
Part	Mo					Scrap	-] ,	Machining	Small Fab	Pro	d. Eng. Coor.	Quality
T dit	•0.				···	Use-as-is	7		noforming	Finishing	-	re/Packaging	Other
NCR	No.					Work Order Update	7		Large Fab	Composite	1	Supplier	1 H
						'	_		ů L		_		
Root					Descri	ption of work order update		Initial	Ac	tion	Sign &		
Cause		Date	Step	Qty	(or Non-conformance	Cł	nief Eng	Desc	ription	Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling							-						
Operator													
Material													
Setup	ļ												
Other	_												
Process	_								,				
Supplier	<u> </u>										1		
Training	<u> </u>	! }									1		
Unapproved	<u> </u>	<u> </u>	<u> </u>	<u> </u>				T CATE			1		
1				<u> </u>		General	AUI	LT CATE	JUKY				
Landi	_	Bending				Bend	Γ	Grain			Ovalized		Pressure/Forced
	\vdash	Centre No	nt Concer	ntric to 1		BOM/Route	\vdash	Hardwa	re.	<u> </u>	Over/Under	tolerance	Temperature/Cure
	\vdash	Cracks	or concer	iti ic to	°′³ ⊢	Broken/Damaged		-{	ion Incomplete	 	Part Incorre	⊢	Weld
		Crushed/	Crimped		-	Burrs		-1	ions Incomplete/	/Unclear	Part Lost/M	<u> </u>	Wrong Stock Pulled
		Cuffs	cpca			Contamination		Mainte	•		Part Moved		J
,	\vdash	Heat Trea	t		<u> </u>	Countersink	-	Mislabe		<u> </u>	Positioned V	Vrong	
		Inspection		Tube		Cut Too Short		Misread			Power Loss/		Other

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drill Holes

Drawing

Finish

September-21-12 11:31:15 AM Item ID: D350-748-241TRN Accept *N900040100* Setup Start **Revision ID:** Crosstube Turning Detail Item Name: **Start Date:** 21/09/2012 Start Qty: 1.00 Cust Item ID: **Required Date:** 05/10/2012 Reg'd Qty: 1.00 **Customer:** Reference: Run Process Plan: Date: Approvals: **Tooling:** Date: Date: SPC (Y/N): Date: Sequence ID/ Operation Set Up/ **Tool ID** Tool # Plan Accept Reject Reject Insp. Work Center ID **Description Run Hours** Code Qty Oty Number Stamp 150 0.00 Large Fab *150* Crosstubes 0.00 12-10-3 Memo Crosstubes 1-DRILL HOLES FOR HEAT TREAT USING DT9806(HOLES MUST BE ALIGNED ON SAME LINE ON BOTH CUFFS) 17-10-2 2-Grind machining marks 160 Outsource process - Heat Treat 0.00 CX 12/10/05 0 *160* Outsource1 0.00 Memo Outsource process - Heat Treat Issue P/O: Heat Treat to min 180 KSI As per Dwg D350-748-241 Sand Blast tube after Heat Treat Possibe Supplier: Vac Aero Ensure Certificate of Conformity is attached 170 Receive & Inspect for Damage & Mat'l Certs 0.00 *170* Packaging 0.00 Memo Packaging Ensure certificate of conformaty is attached

											DQA:	Date:	•
NCR:	Yes	/ No				WORK ORDER NON-C	COI	NFORI	MANCE / UPDATE				*,
											QA Closed:	Date:	
Work Ord	or:				:	DISPOSITION			AGA	INST DE	PARTMENT,	PROCESS	
VVOIR OIG	<u>-</u>					Rework	1		Skid-tube Cross	tube		Water Jet	Engineering
Part !	No.					Scrap	1	•	├	l Fab	Pro	d. Eng. Coor.	Quality
	-		· · · · · · · · · · · · · · · · · · ·			Use-as-is	1 .		~ <u></u>	shing	1	e/Packaging	Other
NCR I	No.					Work Order Update	1		Large Fab Comp		·	Supplier	
	-						_				•		-
Root					Descri	ption of work order update		Initial	Action		Sign &		
Cause		Date	Step	Qty	C	or Non-conformance	Cr	ief Eng	Description		Date	Verification	QC Inspector
Doc/Data	Ш												
Equip/Tooling	Ц												
Operator	Ш						1						
Material	Ц	:						·· .					
Setup	\square	:											
Other	Н												
Process	Н												
Supplier	Н												
Training	Н										,		
Unapproved						r		T CATE	CORV		l	-	
Landi	na G	025		· · · · · · · · · · · · · · · · · · ·		General r	AUL	.I CATE	JORT				
Lanui		Bending			Г	Bend		Grain			Ovalized		Pressure/Forced
	$\boldsymbol{\vdash}$	Centre No	t Concer	itric to 1	_{2/5}	BOM/Route	-	Hardwa	re		Over/Under		Temperature/Cure
	\vdash	Cracks	Concer	ici ic to v	⁵ , –	Broken/Damaged		1	on Incomplete	-	Part Incorred		Weld
	\mathbf{H}	Crushed/0	rimped		-	Burrs		1	ions Incomplete/Unclear		Part Lost/Mi		Wrong Stock Pulled
	\vdash	Cuffs	p = 6.		 	Contamination	\vdash	Mainte	•		Part Moved	·]
	\vdash	Heat Trea	t		<u> </u>	Countersink	\vdash	Mislabe			Positioned V	√rong	
	\vdash	nspection		Tube		Cut Too Short		Misread			Power Loss/		Other

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drill Holes

Drawing

Finish Folio

Page 4

September-21-12 11:31:15 AM Item ID: D350-748-241TRN Accept *N900040100* Setup Start **Revision ID:** Item Name: Crosstube Turning Detail **Start Date:** 21/09/2012 Start Oty: 1.00 **Cust Item ID: Required Date:** 05/10/2012 Req'd Oty: 1.00 **Customer:** Reference: Run Approvals: **Process Plan:** Date: Tooling: Date: Stop QC: Date: SPC (Y/N): Date: Sequence ID/ Operation Set Up/ Tool ID Tool # Reject Plan Accept Reject Insp. **Work Center ID** Description **Run Hours** Qty Code **Qty** Number Stamp 180 QC6-Inspect dimensions to drawing *180* QC Memo Quality Control 190 0.00 Packaging *100* Packaging 0.00 Memo Packaging Identify and stock in kanban rack 200 QC21- Final Inspection - Work Order Release 0.00 QC MF - 12-04 0.00 Memo Quality Control

NCR: Y	es / No				WORK ORDER NON-O	CONF	ORN	MANCE / UP[DATE			· ,
										QA Closed:	Date	:
Work Orde	er:				DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Part N					Rework Scrap		ſ	Skid-tube Machining	Crosstube Small Fab	4	Water Jet d. Eng. Coor.	Engineering Quality
NCR N	lo				Use-as-is Work Order Update] 7		noforming Large Fab	Finishing Composite	Rec/Sto	re/Packaging Supplier	Other
Root				Descri	ption of work order update	Init	tial	Act	ion	Sign &		
Cause	Date	Step	Qty	C	or Non-conformance	Chief	f Eng	Descr	iption	Date	Verification	QC Inspector
Doc/Data												
Equip/Tooling												
Operator												
Material												
Setup	_								٠			
Other												
Process	_						İ					
Supplier	_											
Training												
Unapproved										L		<u> </u>
						AULT (CATE	SORY				
Landin F	ng Gear				General					1		٦,
	Bending			\s	Bend	\mathbf{H}	rain			Ovalized	4.1	Pressure/Forced
ŀ	Centre No	t Concer	itric to C	^{7/5}	BOM/Route	\vdash	ardwa		<u> </u> -	Over/Under	—	Temperature/Cure
}	Cracks	:			Broken/Damaged		-	on Incomplete		Part Incorre	}	Weld Wrong Stock Pulled
}	Crushed/0	rimpea.		-	Burrs	\vdash		ions Incomplete/U nance	nciear	Part Lost/Mi Part Moved	SSING	
}	 I				Countarink	\vdash				4	Mrong	
}	Heat Trea Inspection		Tubo	-	Countersink Cut Too Short	\vdash	islabe isread		-	Positioned V Power Loss/	_	Other
}	Ripples in		rube	<u> </u>	Drill Holes		isreau ffset		L	Jrower Loss/	Juige	Tottlei
}	Torque W		vtrucion		Drawing			alibration				
}	Turning Se				Finish			equence				
L.	I rurilling 36	quence		L	J. 11113(1)	\square	ut 01 3	equence				

Outside Dimensions

DQA:

Date:

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Wave/Twist in Tube

Picklist Print

.•September-21-12 11:31:18 AM

Work Order ID: 90673

D350-748-241TRN

Parent Item Name: Crosstube Turning Detail

90673

D350-748-241TRN

Start Date: 21/09/2012

Required Date: 05/10/2012

Start Qty: 1.00

Required Qty: 1.00

Comments:

Parent Item:

IPP Rev:A New Issue 08-03-06 DD verified by:ec

IPP Rev B Removed polish 08.04.02 EC verified by : DD

IPP Rev C Removed LPS-3 08.06.23 Ec verified by: DD IPP Rev D

11.02.24 as per dwg rev.F DD verf: JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status	
D6015-125		Manufactured	No			120	Each	95.0000	1	1				
D6015-12	5								**					

Crosstube Material

<u>Location</u>	Loc Qty	Loc Code	
HALL	95		
61380	4		
61380 72511	21		I man 1 2/09/24
81022	70		

Page 1

	٠									phy de "	DQA:	Date:	
NCR:	'es	/ No				WORK ORDER NON-	CÓ	NFOR	MANCE / UPD	ATE 🗽			•
							٠.	Ä	1		QA Closed:	Date:	
Work Orde	er:			_		DISPOSITION	 1	e S		AGAINS DE	PARTMENT	PROCESS	
Part N	 lo		X			Rework Scrap Use-as-is		Thern	Skid-tube Machining noforming	Crosstube Small Fab Finishing	Prod	Water Jet d. Eng. Coor. e/Packaging	Engineering Quality Other
NCR N	lo					Work Order Update	J	1952 ·	Large Fab	Composite	7	Supplier	
Root			:	- S	Desci	ription of work order update	Τ	Initial	Actio	n __	Sign &	 	
Cause		Date	Step	Qty		or Non-conformance	Cł	nief Eng	Descrip	otion :	Date	Verification	QC Inspector
oc/Data	_				***			i					
quip/Tooling	_												
perator									,	A STATE OF THE STA	Sales Sales		
⁄laterial									-	$\mathcal{L}_{\mathcal{L}_{2}}$. +	₹ ¹	¥ .
etup									• _ =				
Other	_					essage of the second							
rocess	_								, see .				
upplier	_	·				ş. ş.i		· ·		% 1			
raining	_					<u>.</u>	-	•	e se °e	S	134		
Inapproved						*4	1.				. ===	****	
							AUI	LT CATE	GORY	1. F			
Landir					_	General		1			٦	r	,. 7
·	_	ending				Bend	\vdash	Grain			Ovalized		Pressure/Forced
	_	entre No	t Concer	ntric to	o/s	BOM/Route	<u> </u>	Hardwa	ta. *·		Over/Under	 	Temperature/Cure
]	_	racks			_	Broken/Damaged	<u> </u>	4	on Incomplete		Part Incorred	·	Weld
		rushed/C	Crimped		-	Burrs	<u> </u>	4	ions Incomplete/Un	clear	Part Lost/Mi	ssing	Wrong Stock Pulled
}	_	uffs			<u> </u>	Contamination		Mainte			Part Moved		
	-	leat Treat			- \ \	Countersink	-	Mislabe		<u> </u>	Positioned W	_	٦
-		rspection		Tube	_	Cut Too Short		Misread	I	L	Power Loss/	Surge	Other
		ipples in			L	Drill Holes	4	Offset	S				
}		orque W		xtrusio	י	⊣		1 ~~~	Calibration				
		urning Se			L	Finish	\vdash	-	equence		•		
i	١٧	Vave/Twi	ist in Tub	e		Folio	1	Outside	Dimensions				<i>(</i> :-

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DART AEROSPACE LTD	Work Order:	90673
Description: Crosstube Assembly (AS350/355 High Aft)	Part Number:	D350-748-241
Inspection Dwg: D350-748-241 Rev: F		Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

2.240 2.180 2.180 2.208 2.234 2.253 2.272 2.299	+0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000	Actual Dimension 2.243 2.185 2.185 2.256 2.256 2.304	Accept	Reject	Method of Inspection	Comments (NCO8
2.180 2.180 2.208 2.234 2.253 2.272 2.299	+0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000	2.183 2.185 2.238 2.238 2.256 2.277 2.304			· /	CNC-08
2.180 2.208 2.234 2.253 2.272 2.299	+0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000	2.185 2.2313 2.236 2.256 2.277 2.304			· /	
2.208 2.234 2.253 2.272 2.299 0.063	+0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000	2.185 2.2313 2.236 2.256 2.277 2.304	/			
2.234 2.253 2.272 2.299 0.063	+0.005/-0.000 +0.005/-0.000 +0.005/-0.000 +0.005/-0.000	2.23/3 2.256 2.277 2.304				
2.253 2.272 2.299 0.063	+0.005/-0.000 +0.005/-0.000 +0.005/-0.000	2.256				
2.272 2.299 0.063	+0.005/-0.000 +0.005/-0.000	2.277				
2.299 0.063	+0.005/-0.000	2.277				
0.063 g	18				U	
					1	
	+/-0.010	711				
4.26		1,067			vern	CNC-08
	+/-0.030	4.26				C+4 - 00
R0.063	+/-0.010	067				
R0.50	+/-0.030				11	
		70.				
2.240	+0.005/-0.000	2.243			VOCO	CWL-08
2.180	+0.005/-0.000	2.183)	2002-00
2.180	+0.005/-0.000	7.185	7			
2.208	+0.005/-0.000	2013	7			
2.234	+0.005/-0.000	3732				
2.253	+0.005/-0.000	7.256				
2.272	+0.005/-0.000	2277	-/		100	
2.299	+0.005/-0.000	2304				
	4				<u>u</u>	
0.063	+/-0.010	.063			1/1/1/0	cvado
4.26	+/-0.030					LVILLO
R0.063	+/-0.010		/			
R0.50	+/-0.030		/		70	
122.70	+/-0.060	122.70			TAPE	16-22
	R0.063 R0.50 2.240 2.180 2.180 2.208 2.234 2.253 2.272 2.299 0.063 4.26 R0.063 R0.50	4.26	4.26	4.26	4.26	4.26

NCR:	CR: Yes / No					WORK ORDER NON-	CON	VFOR	MANCE / UPI	DATE			
									-		QA Closed:	Date:	
Work Ord	er:					DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Part NCR	No.					Rework Scrap Use-as-is Work Order Update			Skid-tube Machining noforming Large Fab	Crosstube Small Fab Finishing Composite	4	Water Jet d. Eng. Coor. re/Packaging Supplier	Engineering Quality Other
Root					Descri	ption of work order update	li	nitial	Act	ion	Sign &		
Cause		Date	Step	Qty		or Non-conformance	Chi	ief Eng	Descr	iption	Date	Verification	QC Inspector
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved													
						F	AUL	T CATE	GORY				
Landi	_					General					7	_	.
		Bending Centre No	ot Concer	ntric to	o/s	Bend BOM/Route		Grain Hardwa			Ovalized Over/Under	 	Pressure/Forced Temperature/Cure
	\vdash	Cracks	o ·		<u> </u>	Broken/Damaged	-		on Incomplete		Part Incorred		Weld
		Crushed/ Cuffs	Crimped		-	Burrs	\vdash	Instruct Mainte	ions Incomplete/L	Inclear	Part Lost/Mi Part Moved	ssing	Wrong Stock Pulled
	Н	Heat Trea				Contamination Countersink	-	Mislabe		<u> </u>	Positioned V	Urana	
	\vdash	Inspection		Tube	<u> </u>	Cut Too Short	-	Misreac		-	Power Loss/		Other
	—-	Ripples in		TUDE		Drill Holes	-	Offset	•	<u>L</u>	J. ower 2033/.		Total
	${f -}$	Torque W		xtrusio	,	Drawing	$\boldsymbol{\vdash}$		Calibration	•			
	Н	Turning S			-	Finish	$\boldsymbol{\vdash}$		Sequence		******		

Outside Dimensions

Date:

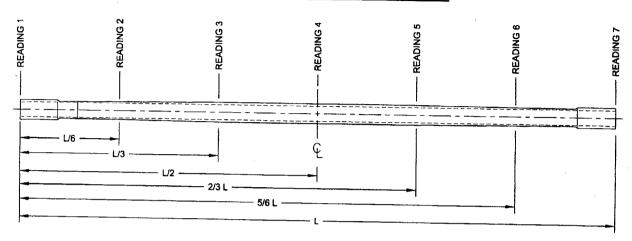
DQA:

Wave/Twist in Tube

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DART AEROSPACE LTD	Work Order:	90673
Description: Crosstube Assembly (AS350/355 High Aft)	Part Number:	D350-748-241
Inspection Dwg: D350-748-241 Rev: F		Page 2 of 2

WALL THICKNESS MEASUREMENT



	WALL	THICKNESS	MEASUREME	NT (IN)	Deviation	
Location	w1	w2	w3	w4	Δw (max-min)	TOLERANCE
READING 1 L= 0"	.118	1.22	.129	.124	-611	
READING 2	,090	.091	1/2	.110	.022	
READING 3	.116	.132	144	.131	028	
READING 4	.152	.154	.153	153	.062	0.030"
READING 5	.136	.126	.124	-133	.6//	
READING 6	-094	.086	.160	-112	.026	
READING 7 L= CM G	.1/8	.113	.121	.135	'C 22	

Calibration Result

Actual Block Thickness: -100-500

Sitescan 250 Measured Thickness: 100 . SOO

Meas		and Audited by: The	Preliminary Approval:	
	Date:	2/09/28 Date: 12-9-28	Date:	
Rev	Date	Change	Davingd by	
Α	07.01.17	New Issue (P/O D350-748-201)	Revised by	Approved
В	12.02.02	Dwg Rev updated	KJ/JLM	
С	12.06.04	Wall thickness form added	KJ KJ	

											DQA	: Date:	
NCR:	Yes	/ No				WORK ORDER NON-	COI	VFORI	MANCE / UP	DATE			
											QA Closed	: Date:	
Work Ord	ar:					DISPOSITION				AGAINST D	EPARTMEN	T/PROCESS	
work Ord	er.				 	Rework	7	•	Skid-tube	Crosstube	٦	Water Jet	Engineering
Part I	ملا					Scrap	-		Machining	Small Fab	Pr	od. Eng. Coor.	Quality
raiti	v O.					Use-as-is	1		noforming	Finishing	⊣	ore/Packaging	Other
NCR I	Vο					Work Order Update	1	1110111	Large Fab	Composite	1	Supplier	1
	•••		. ,				_			L	. 	''	·
Root					Descri	ption of work order update		nitial	Ac	tion	Sign &		
Cause		Date	Step	Qty		or Non-conformance	Ch	ief Eng	Desc	ription	Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling													
Operator													
Material													
Setup													
Other													
Process													
Supplier													
Training													
Unapproved		l	<u> </u>		<u> </u>								
					·		AUL	T CATE	GORY		· · · · · ·		
Landi	ng (Gear			_	General		,				_	7
	_	Bending			<u> </u>	Bend		Grain		<u></u>	Ovalized	<u> </u>	Pressure/Forced
		Centre No	ot Concer	ntric to	o/s	BOM/Route		Hardwa			⊣ `	r tolerance	Temperature/Cure
		Cracks				Broken/Damaged		i '	on Incomplete	<u> </u> _	Part Incorre	<u> </u>	Weld
		Crushed/0	Crimped.			Burrs	1	Instruct	ions Incomplete/	Unclear	Part Lost/N	1issing	Wrong Stock Pulled

Maintenance

Out of Calibration
Out of Sequence

Outside Dimensions

Mislabeled

Misread

Offset

Contamination

Countersink

Cut Too Short

Drill Holes

Drawing

Finish Folio Part Moved

Positioned Wrong

Power Loss/Surge

Other

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Cuffs

Heat Treat

Inspection Strip in Tube

Torque Waves in Extrusion

F

D

С

item	Qty -241	Part Number	Description
1	х	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	_ 1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC, M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:



1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125

FINISHED LENGTH = 122.700±0.06

2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2 CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2 PAINT OUTSIDE PER DART QSI 005 4.2

- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.

BREAK SHARP EDGES: 0.005 TO 0.010 MAX

- IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 29.85 lbs

PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.

- RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.

11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.

12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.

13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CARE FUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT

NUT HAS NOT BOTTOMED OUT AFTER TORQUING.

15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COTY RETURN 10 **ENGINEFRING** TINCONTROL! LD COPY SUBJECT TO AMENDATION! WITHOUT NOTICE

WORK ORDER NO. 90673 MLJ

12-09-21 UNDER REVIEW



F	TWIST	Γ LIMIT (A8-1,	PTION (B8-1) PER PAR 09-040, ADD C1-3), ADD D6015-125 OPTION 1 NOW MACHINED (D1-4)	СР	10.11.23
Е	STAN	DARDS; REL	NOTES; UPDATE TO CURRENT OCATED FLAG #6 PER PAR 08-046 LERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG.	PARTICLE AN	ND CAD PLATE AS MFD.	CP	06.10.31
С	ADD C	AD PLATING		CP	06.08.14
В	ADD D	6018-125 & F	RIME AND PAINT	CP	06.06.30
Α	NEW I	SSUE		CP	06.03.31
REV.			DESCRIPTION	BY	DATE
DESIGN		97	DART AEROSP	ACE	LTD
DRAWN		92	HAWKESBURY, ONTAR		
CHECKE	D	4	DRAWING NO.		REV F

MFG. APPR. D350-748-241 SHEET 1 OF 4 APPROVED TITLE CROSSTUBE (AS 350/355 HI AFT) DATE COPYRIGHT © 2006 BY DART AEROSPACE LTD 10.11.23

1864

NCR: Y	es / No				WORK ORDER NON-C	100	NFORM	MANCE / UPDA ⁻	TE	·			••
									- · · · · · · · · · · · · · · · ·	QA Closed:	Da	te:	
Work Orde	er:			,	DISPOSITION				AGAINST DE	PARTMENT	PROCESS		
Part N					Rework Scrap Use-as-is		ſ	Machining	Crosstube Small Fab Finishing		Water Jet d. Eng. Coor. e/Packaging		Engineering Quality Other
NCR N	lo				Work Order Update			Large Fab Co	omposite		Supplier		
Root					ption of work order update		nitial	Action		Sign &			
Cause	Date	Step	Qty	(or Non-conformance	Ch	ief Eng	Descripti	on	Date	Verificatio	n	QC Inspector
Doc/Data	_												
Equip/Tooling													
Operator						l							
Material													
Setup													
Other	_										:		
Process	_												
Supplier	_												
Training	_												
Unapproved		1	<u> </u>		E	<u> </u>	T CATE	EOBA					
Landir	ng Gear				General	40L	CATE	JON					
	Bending				Bend		Grain			Ovalized		Пр	ressure/Forced
}	Centre No	nt Concer	ntric to ()/s	BOM/Route	\vdash	Hardwa	re	 	Over/Under	tolerance	}	emperature/Cure
<u> </u>	Cracks	or concer		""	Broken/Damaged	\vdash	1	on Incomplete		Part Incorred		\vdash	Veld
	Crushed/	Crimped		-	Burrs		1 '	ons Incomplete/Uncle	ear 📙	Part Lost/Mi		⊢⊣	Vrong Stock Pulled
ľ	Cuffs		•	ļ	Contamination		Mainte			Part Moved		——	· ·
· ·	Heat Trea	ıt			Countersink		Mislabe			Positioned V	/rong		
ŀ	Inspection		Tube		Cut Too Short	\vdash	Misread			Power Loss/	-	Пс	Other
ļ	Ripples in	•			Drill Holes	-	Offset		<u> </u>	,	J		
<u> </u>	Torque W		xtrusion	,	Drawing		Out of C	alibration					

Out of Sequence

Outside Dimensions

DQA:

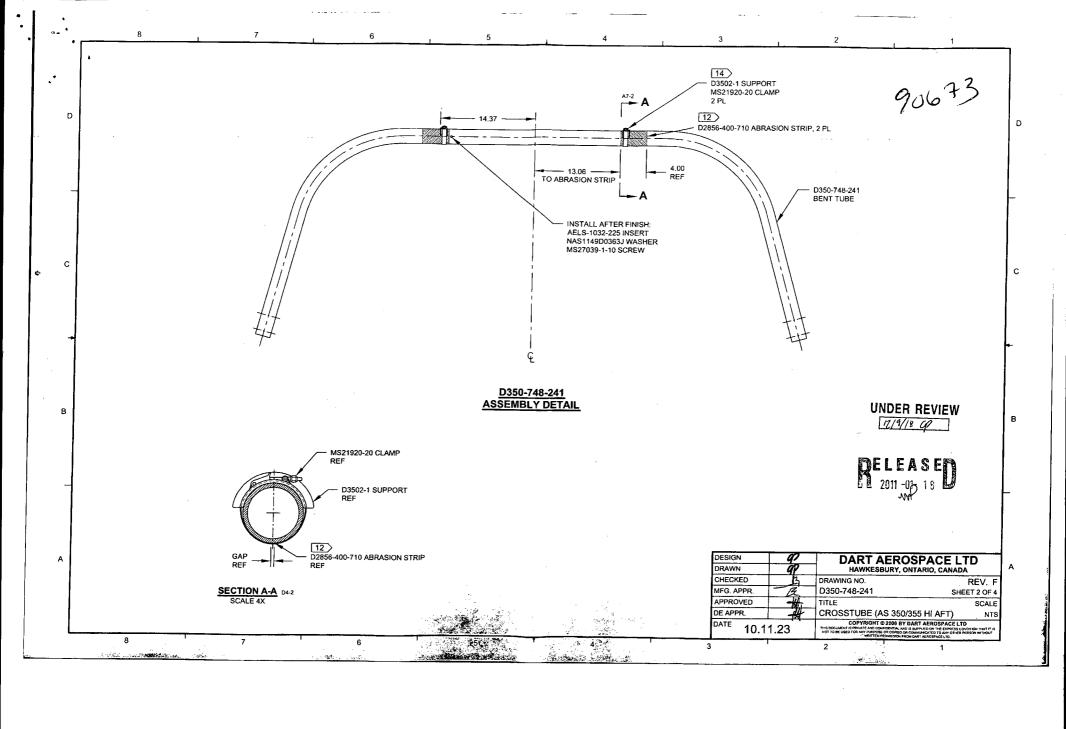
Date:

Turning Sequence

Wave/Twist in Tube

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G



NCR: Y	es / No				WORK ORDER NON-O	CON	NFORM	MANCE / UPI	DATE			٠,
										QA Closed:	Date	2:
Work Orde	er:	111			DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Part N					Rework Scrap Use-as-is		Therm	Skid-tube Machining noforming	Crosstube Small Fab Finishing	-	Water Jet d. Eng. Coor. re/Packaging	Engineering Quality Other
NCR N	lo				Work Order Update	╵┃		Large Fab	Composite]	Supplier	
Root	_				ption of work order update	1	nitial	Act		Sign &		061
Cause	Date	Step	Qty	(or Non-conformance	Ch	ief Eng	Descr	iption	Date	Verification	QC Inspector
Doc/Data	_							İ				
Equip/Tooling							·					
Operator												
Material												
Setup												
Other												
Process												
Supplier	_											,
Training												
Unapproved		<u> </u>										
					·	AUL	T CATE	3ORY				
Landir	ng Gear				General		l		 	٦		٦
	Bending				Bend	-	Grain		<u> </u>	Ovalized		Pressure/Forced
}	Centre N	ot Concei	ntric to C	^{D/S}	BOM/Route	\vdash	Hardwa		<u> </u>	Over/Under	<u> </u>	Temperature/Cure
ŀ	Cracks				Broken/Damaged	-		on Incomplete	<u> </u>	Part Incorred	⊢	Weld
<u> </u>	Crushed/	'Crimped			Burrs	\vdash		ions Incomplete/L	Jnclear	Part Lost/Mi	ssing	Wrong Stock Pulled
	Cuffs			ļ	Contamination	-	Mainte		<u> </u>	Part Moved		
1	Heat Trea			<u> </u>	Countersink	\vdash	Mislabe		<u> </u> _	Positioned V		- 1 .
	Inspectio	•	Tube	<u> </u>	Cut Too Short	-	Misread	I		Power Loss/	Surge	Other
ļ	Ripples in				Drill Holes	\vdash	Offset			****		
	Torque V	Vaves in E	xtrusion		Drawing		Out of C	Calibration				

Out of Sequence

Outside Dimensions

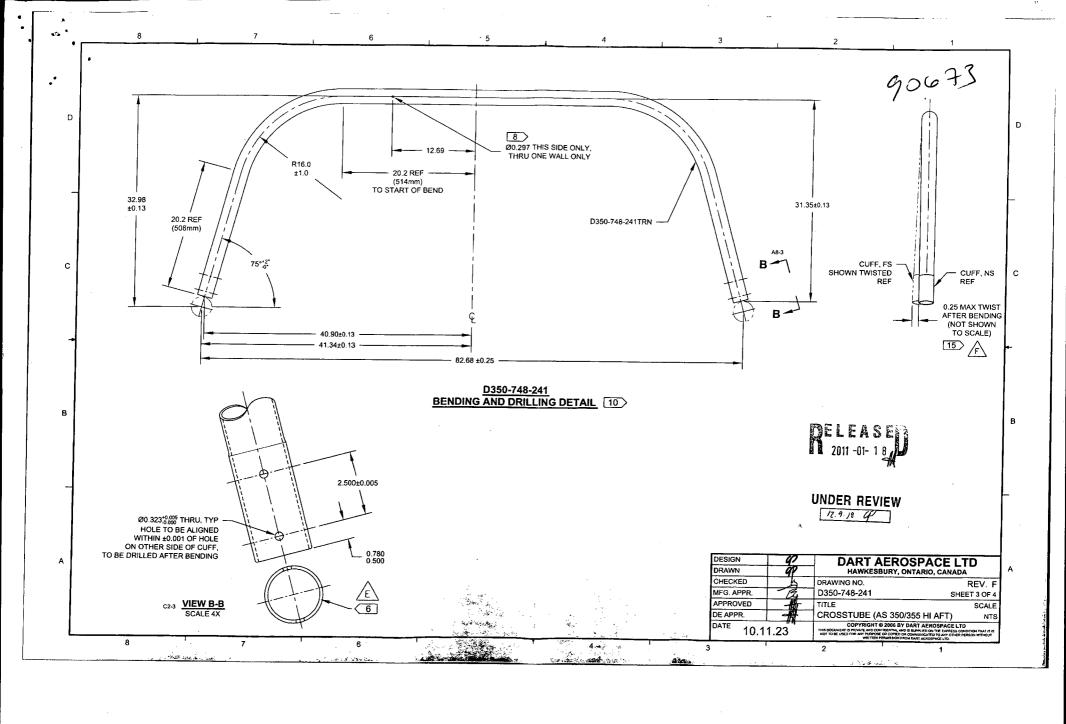
DQA:

Date:

Turning Sequence

Wave/Twist in Tube

Finish



											DQA:	Date:	•
NCR:	Yes	/ No				WORK ORDER NON-	COI	NFORM	MANCE / UPDATE		,		·,
									·		QA Closed:	Date:	
Marile Ond						DISPOSITION			AGAI	NST DE	PARTMENT	PROCESS	
Work Ord	er:					Rework	7		Skid-tube Crosst	uho]	Water Jet	Engineering
Part I	No.					Scrap	-		Machining Small		Pro	d. Eng. Coor.	Quality
Paiti	NO.					Use-as-is	┤		noforming Finish		1	e/Packaging	Other
NCR I	۷o					Work Order Update	1		Large Fab Compo	~ - -	1100/3101	Supplier	
l Henri	10.						J				J		. — — — — — — — — — — — — — — — — — — —
Root					Descri	ption of work order update	\Box	Initial	Action		Sign &		
Cause		Date	Step	Qty	; (or Non-conformance	Cr	nief Eng	Description		Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling													
Operator				ļ									
Material													
Setup													
Other													
Process													
Supplier													
Training													
Unapproved	<u> </u>				İ		<u></u>						
							AUL	T CATE	GORY				
Landi						General	$\overline{}$	la :	•	Γ]	[-]
	\vdash	Bending	_			Bend	<u> </u>	Grain		<u> </u>	Ovalized	⊢	Pressure/Forced
	-	Centre No	ot Concer	itric to	U/S	BOM/Route	<u> </u>	Hardwa		<u> </u>	Over/Under		Temperature/Cure
	-	Cracks	C		_	Broken/Damaged	\vdash	-1 '	on Incomplete	<u> </u>	Part Incorred		Weld
1		Crushed/	crimped.		1	Burrs	1	Jinstruct	ions Incomplete/Unclear		Part Lost/Mi	22111B	Wrong Stock Pulled

Maintenance

Out of Calibration

Out of Sequence

Outside Dimensions

Mislabeled

Misread

Offset

Part Moved
Positioned Wrong

Power Loss/Surge

Other

Contamination

Countersink

Cut Too Short

Drill Holes

Drawing

Finish

Folio

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Ripples in Bend

Turning Sequence

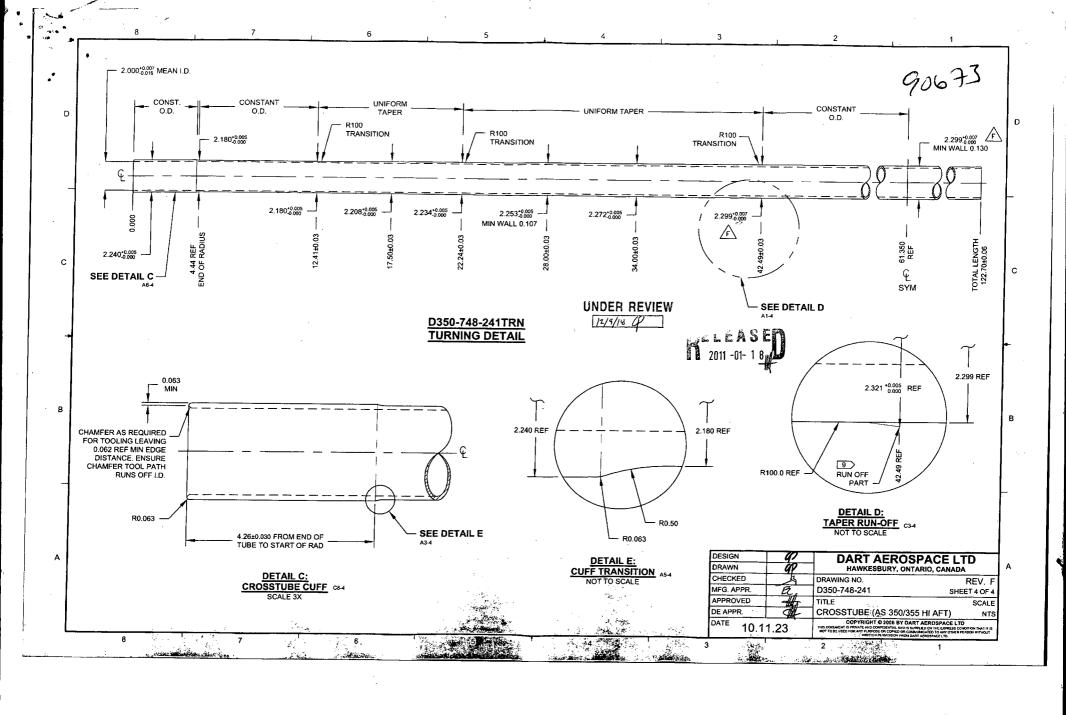
Wave/Twist in Tube

Cuffs

Heat Treat

Inspection Strip in Tube

Torque Waves in Extrusion



										DQA:	Date:	
NCR: Ye	es / No				WORK ORDER NON-	COL	NFORI	MANCE / UP	DATE			
·										QA Closed:	Date:	
Work Order	·•	•			DISPOSITION				AGAINST DI	PARTMENT	/PROCESS	
Work Oraci	•				Rework	7		Skid-tube	Crosstube]	Water Jet	Engineering
Part No) .				Scrap	1	1	Machining	Small Fab	Pro	d. Eng. Coor.	Quality
					Use-as-is	1	Thern	noforming	Finishing	Rec/Sto	re/Packaging	. Other
NCR No	o				Work Örder Update			Large Fab	Composite		Supplier	
				, · · · · · · · · · · · · · · · · · · ·		igstar		-	1	i i		
Root					iption of work order update	ı	nitial		tion	`∵Sign &		
Cause	Date	Step	Qty		or Non-conformance	Ch	ief Eng	Desc	ription	Date	Verification	QC Inspector
Doc/Data												
Equip/Tooling					•					,		
Operator			1.	,		1						,
Material	·.											
Setup	پ.											*
Other												
Process												
Supplier			184				*	· ·				e.
Training								*				
Unapproved												
					F	AUL	T CATE	GORY				· · · · · · · · · · · · · · · · · · ·
Landing	Gear				General					 -		•
	Bending				Bend		Grain .		1	Ovalized		Pressure/Forced
[Centre No	ot Conce	ntric to	o/s	BOM/Route		Hardwa	re	`	Over/Under	tolerance	Temperature/Cure

Centre Not Concentric to O/S Inspection Incomplete Weld Cracks -Broken/Damaged* Part Incorrect Crushed/Crimped. Instructions Incomplete/Unclear Part Lost/Missing Wrong Stock Pulled Burrs Part Moved Cuffs Maintenance Contamination Positioned Wrong Heat Treat Countersink Mislabeled Other Misread Power Loss/Surge Inspection Strip in Tube Cut Too Short Drill Holes Offset Ripples in Bend Torque Waves in Extrusion Out of Calibration Drawing Turning Sequence Finish Out of Sequence Folio Wave/Twist in Tube **Outside Dimensions**

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

6 E. MERMAID LANE WYNDMOOR, PA 19038

Voice:

215-233-2600

Fax:

215-233-5653

Sold To:

DART AEROSPACE 1270 ABERDEEN STREET HAWKESBURY, ON K6A 1K7 acking List

Sales Order Number .74295

> Sales Order Date Oct 16, 2012

> > Page:

Ship To: DART AEROSPACE 1270 ABERDEEN STREET HAWKESBURY, ON K6A 1K7

C		
Customer ID	PO Number	Payment Terms
DARA	PO18083	Not 20 Day
	Ship Via	
	CALL CUSTOMER	Process
	TOO TOWILLY	HT

Quantity	Item	Description		
16.00	EACH	E350-748-141TRN CROSSTUBE HEAT TREAT TO MIN 180 KSI (MIL-T-6736 OR AMS 2759-1C) SANDBLAST TUBE AFTER HEAT TREAT 260 POUNDS TOTAL	Total Shipped	This Shipment
1.00	CERT.			
The second second second second second second second second second second second second second second second se				

COMMENTS

SHIPPED BY, SIGNATURE **METLAB**

DATE

RECEIVED BY, SIGNATURE DART AEROSPACE

DATE



Certification

SOLD TO

Dart Aerospace Ltd. 1270 Aberdeen Street Hawkesbury, ON K6A 1K7

November 13, 2012

Metlab Shop Order No:

74295

Purchase Order:

P018083

Description:

Crosstube

Part No.:

E350-748-141TRN

Quantity:

16 Pieces

Weight:

260 Pounds

Material:

4130 Alloy Steel

Specifications:

Heat Treat to Minimum 180 KSI (MIL-T-6736 OR AMS 2759-1C).

Sandblast tube after heat treat.

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

Results:

Hardness: HRC 40-42 (180-192 ksi converted)

METLAB

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



D 350 X-TUBE CUFF MEASURMENTS AFTER HEAT TREATING

ſ	TYPE	BATCH#	SIDE A	SIDE B
			TWO READINGS	TWO READINGS
1	AFT	90671	2.251"/20238"	2.238"/2.243"
2	AFT	90670	2.235"/2.247"	2.236"/2.250"
3	AFT	90675	2.220"/2.261"	2.235"/2.257"
4	AFT	90672	2.239"/2.264"	2.240"/2.242"
5	AFT	90676	2.238"/2.240"	2.247"/2.254"
6	AFT	90674	2.238"/2.245"	2.242"/2.258"
7	AFT	90688	2.239"/2.251"	2.238"/2.247"
8	AFT	90677	2.242"/2.247"	2.238"/2.256"
9	AFT			
10	AFT			
11	7		4.	
12	FWD	84664	2.234"/2.249"	2.209"/2.274"
13	FWD		0.00-11/0.00411	0.405"/0.050"
	FWD	86273	2.227"/2.261"	2.195"/2.258"
14	FWD	86273 84665	2.227°/2.261" 2.239"/2.245"	2.195"/2.258" 2.214"/2.276"
_				·
15	FWD	84665	2.239"/2.245"	2.214"/2.276"
14 15 16 17	FWD FWD	84665 84654	2.239"/2.245" 2.210"/2.275"	2.214"/2.276" 2.246"/2.249"
15 16	FWD FWD	84665 84654 84661	2.239"/2.245" 2.210"/2.275" 2.246"/2.254"	2.214"/2.276" 2.246"/2.249" 2.193"/2.287"
15 16 17	FWD FWD FWD	84665 84654 84661 84663	2.239"/2.245" 2.210"/2.275" 2.246"/2.254" 2.212"/2.272"	2.214"/2.276" 2.246"/2.249" 2.193"/2.287" 2.247"/2.252"
15 16 17 18	FWD FWD FWD FWD	84665 84654 84661 84663 86272	2.239"/2.245" 2.210"/2.275" 2.246"/2.254" 2.212"/2.272" 2.266"/2.212"	2.214"/2.276" 2.246"/2.249" 2.193"/2.287" 2.247"/2.252" 2.243"/2.253"
15 16 17 18 19	FWD FWD FWD FWD FWD	84665 84654 84661 84663 86272	2.239"/2.245" 2.210"/2.275" 2.246"/2.254" 2.212"/2.272" 2.266"/2.212"	2.214"/2.276" 2.246"/2.249" 2.193"/2.287" 2.247"/2.252" 2.243"/2.253"
15 16 17 18 19	FWD FWD FWD FWD FWD FWD	84665 84654 84661 84663 86272	2.239"/2.245" 2.210"/2.275" 2.246"/2.254" 2.212"/2.272" 2.266"/2.212"	2.214"/2.276" 2.246"/2.249" 2.193"/2.287" 2.247"/2.252" 2.243"/2.253"